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Radio Standards Specification

Wireless Power Transfer Devices

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Canada

Preface

The Radio Standards Specification RSS-216, issue 3, *Wireless Power Transfer Devices*, replaces RSS-216, issue 2, published in January 2016 and amended in September 2020.

Listed below are the main changes:

1. increased the maximum separation distance from 10 cm to 50 cm in case of wireless power transfer (WPT) systems for electric vehicles, and from 10 cm to 20 cm for all other WPT devices: section 1(b)/(c);
2. increased the maximum operation frequency from 400 MHz to 40 GHz and added limits for radiated emissions above 1 GHz: sections 1(d) and 5.3.3.3;
3. removed the condition for seeking additional instructions from ISED if the device is medical equipment (from section 1) and added specific requirements for WPT devices that can operate while implanted in or worn on the human body: section 5.2.2;
4. adopted ANSI C63.30-2021, with deviations: sections 4.3, 5.2.1 and annex A;
5. clarified that RSS-216 must be used in conjunction with RSS-Gen and/or ICES-Gen: section 4.4;
6. clarified requirements applicable in case of multiple power voltages or wide power voltage range: section 5.1;
7. clarified what equipment is considered industrial, scientific, and medical (ISM) equipment: section 5.3.1;
8. included the limits in RSS-216, instead of referring to ICES-001: sections 5.3.2 and 5.3.3;
9. added alternative limits, based on RSS-210, which are permitted under certain conditions: section 5.4;
10. referred to RSS-102 for radio-frequency (RF) exposure requirements: section 5.5.

While this standard is numbered using the convention for licence-exempt radio apparatus, it applies to devices that can be categorized as either interference-causing equipment or licence-exempt radio apparatus (of category I or category II). ISED is of the view that having all wireless power transfer devices under one standard (instead of one ICES, one RSS-200 series, and one RSS-300 series) provides greater benefits and convenience.

Inquiries may be submitted by one of the following methods:

1) Online, using the General Inquiry form (in the form, select the Directorate of Regulatory Standards radio button and specify "RSS-216" in the General Inquiry field)

2) By mail to the following address:

   Innovation, Science and Economic Development Canada
   Engineering, Planning and Standards Branch
   Attention: Regulatory Standards Directorate
   235 Queen Street
   Ottawa, Ontario K1A 0H5
   Canada

3) By email to consultationradiostandards-consultationnormesradio@ised-isde.gc.ca

Additional information and guidance are available on the Innovation, Science and Economic Development Canada (ISED) webpages Common Questions and Answers and General Notices.

Comments and suggestions for improving this standard may be submitted online using the Standard Change Request form or by mail or email to the above addresses.

All spectrum and telecommunications related documents are available on ISED's Spectrum Management and Telecommunications website.

Issued under the authority of the
Minister of Innovation, Science and Industry

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Martin Proulx
Director General
Engineering, Planning and Standards Branch

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1. Scope

This radio standards specification (RSS) sets out the requirements applicable to wireless power transfer (WPT) devices, including sources (WPT transmitters) and clients (WPT receivers).

RSS-216 only applies to the WPT function(s) of the device. Other ISED standards can apply to the device, depending on its other functions, such as an interference-causing equipment standard (ICES) or other RSS(s).

Some WPT devices include radio apparatus modules or subassemblies operating on secondary frequencies (see the definition in section 4.1), such as for exchanging information between the WPT source and WPT clients. These radio apparatus modules or subassemblies are subject to the RSS(s) applicable to the corresponding transmit frequency and radio technology.

WPT devices are classified as either interference-causing equipment or licence-exempt radio apparatus and they operate on a no interference, no protection basis. The classification of WPT devices is described in section 3.

Some WPT devices require a special authorization, as follows:

a. WPT devices with a transmitted power in excess of 500 W, based on the maximum required input power for WPT source devices (e.g. from the alternative-current mains) and on the maximum output power for WPT client devices (e.g. at the direct-current input terminals of the load battery);

b. Devices intended for charging electric vehicles through WPT that are capable of WPT over separation distances greater than 50 cm;

c. Devices, not intended for charging electric vehicles through WPT, capable of WPT over separation distances greater than 20 cm;

d. The WPT fundamental frequency is greater than 40 GHz.

For any of the four cases listed above, prior to applying RSS-216 for verifying the compliance of the equipment, ISED shall be notified either through the *Special Authorization Form* or by using one of the three methods specified in the Preface.

DRS, upon receiving the initial inquiry, will advise if additional information is necessary. For details on the special authorization process, see RSP-102, *Special Authorization Procedure for Terminal, Radio, Broadcasting and Interference-Causing Equipment to be Certified, Registered or Deemed in Compliance with Technical Equipment Standards*.

2. Coming into force and transition period

This issue of RSS-216 will come into force upon its publication on ISED website. However, a transition period is provided, ending one year after the publication of this standard, within which compliance with either issue 2 or issue 3 of RSS-216 is accepted. A copy of issue 2 of RSS-216 can be requested by email. After this period, applications for certification will only be accepted under issue 3 of RSS-216 and equipment manufactured, imported, distributed, leased, offered for sale, or sold in Canada shall comply with issue 3 of RSS-216.

3. Classification

This section differentiates between the possible types of WPT devices and also provides the classification criteria. The main criterion is related to the fundamental transmission on the WPT frequency, more specifically if it carries information or not.

3.1 Types of WPT devices

This section defines the three possible types of WPT devices.

3.1.1 Type 1 (interference-causing equipment)

Type 1 includes the following:

a. WPT devices that are incapable of transmitting electromagnetic energy on the frequency or frequencies they use for wireless power transfer

b. WPT devices that are capable of transmitting electromagnetic energy on the frequency or frequencies they use for wireless power transfer, but that do not transmit any form of intelligent communication, including communication related to power transfer management, on those frequencies, and they do not use the alternative limits specified in section 5.4

Type 1 WPT devices are classified as interference-causing equipment.

3.1.2 Type 2 (Category II radio apparatus)

Type 2 includes WPT devices that intentionally transmit electromagnetic energy on the WPT frequency and use some form of modulation on this frequency for transmitting information, including communication related to wireless power transfer management (such as WPT devices using load modulation techniques; see the definition in section 4.1), and that comply with the following two conditions:

a. Fundamental emissions are below 490 kHz; and

b. All emissions radiated by the WPT subassembly are at least 40 dB below the general field strength limits specified in RSS-Gen.

Type 2 WPT devices are classified as Category II radio apparatus; see RSS-Gen.

3.1.3 Type 3 (Category I radio apparatus)

Type 3 includes WPT devices that intentionally transmit electromagnetic energy on the WPT frequency and use some form of modulation on this frequency for transmitting information, including communication related to wireless power transfer management (such as WPT devices using load modulation techniques), and that do not meet one or both conditions specified at 3.1.2(a) and 3.1.2(b). Additionally, WPT devices that use the alternative emission limits specified in section 5.4 are also Type 3 (regardless if they transmit information on the WPT signal or not).

Type 3 WPT devices are classified as Category I radio apparatus; see RSS-Gen.

3.2 Classification of WPT devices

The WPT source device is classified as Type 1, Type 2, or Type 3 based on the criteria from section 3.1.

Generally, the WPT client device is only able to receive electromagnetic energy on the WPT frequency and is unable to transmit it. As such, this device is classified as Type 1. However, if the WPT client device is also able to transmit electromagnetic energy on the WPT frequency (e.g., for the purpose of communicating with the WPT source), then its classification shall be based on the criteria in section 3.1.

WPT devices that can operate in two modes, as a WPT source and as a WPT client, shall meet the requirements applicable for both WPT source and WPT client, when in the corresponding mode of operation.

4. General requirements

This section specifies the definitions, authorization process, references and general requirements related to this standard.

4.1 Definitions

electric vehicle: any type of vehicle intended for operation on land that has electric or hybrid propulsion (for more details see the definition in subclause 3.1 of ANSI C63.30-2021).

load modulation: communication technique between WPT sources and WPT clients that is strictly limited to power transfer management and is performed by modulating the WPT frequency.

power transfer management: capability of some WPT devices to exchange information related to the power transfer operation between the source and the client for detecting invalid devices or objects, communicating status information, sending commands from the source to the client, sending acknowledgements from the client to the source, etc.

radio apparatus module: part (subassembly) of a WPT device that intentionally transmits radiated electromagnetic energy on one or more secondary frequencies (in ANSI C63.30, these are called "wireless modules").

secondary frequency: any frequency or channel, other than the WPT fundamental signal, on which a WPT device intentionally transmits radiated electromagnetic energy.

separation distance: distance over which wireless power is transferred from a WPT source to a WPT client. It is defined from the transmitting surface of the WPT source (its "WPT zone", usually on the top of the WPT source) to the receiving surface of the WPT client (usually the bottom of the WPT client).

wireless power transfer (WPT): the transfer of energy between a source and one or more client devices through radio waves, with no electrical contact between them, for the purpose of powering or charging the client devices.

WPT client: device designed to receive power from a WPT source through radio waves. A WPT client is not designed to transmit power wirelessly but can support power transfer management.

WPT device: a WPT source, a WPT client, or a system that includes a combination of WPT source and client devices.

WPT source: device directly connected (i.e. through a wired connection) to a power source (e.g. AC mains, a battery or some other source of internal or external electrical power) and which is designed to transfer power wirelessly to one or more WPT client devices.

4.2 Authorization process

This section specifies the authorization process.

4.2.1 Category I equipment

Type 3 WPT devices are authorized based on certification. The associated requirements are described in RSS-Gen and in the radio standards procedure RSP-100, *Certification of Radio Apparatus and Broadcasting Equipment*.

If the WPT source or WPT client device incorporates one or more radio apparatus modules, it might require certification (e.g., when at least one of these modules is not certified). Consult RSP-100 to determine if certification of the host is necessary in this case.

4.2.2 Category II equipment

Type 1 and Type 2 WPT devices are authorized based on supplier's declaration of conformity (SDoC) and they are exempt from certification and registration. The label placed on each unit of the equipment model, according to the applicable standard (RSS-216 in this case), represents the SDoC with ISED requirements. See ICES-Gen for more information on the SDoC process.

If the Type 1 or Type 2 WPT device incorporates one or more Category I radio apparatus modules, see section 4.2.1.

4.3 Normative references

The following documents are referenced in this standard such that some or all of their content is indispensable for the application of RSS-216. Unless otherwise stated, the equipment shall comply with the requirements specified in these documents, as applicable.

- RSS-Gen, *General Requirements for Compliance of Radio Apparatus*
- ICES-Gen, *General Requirements for Compliance of Interference-Causing Equipment*
- RSP-100, *Certification of Radio Apparatus and Broadcasting Equipment*
- RSS-102, *Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)*
- ANSI C63.2-2023, *American National Standard for Specifications of Electromagnetic Interference and Field Strength Measuring Instrumentation in the Frequency Range of 9 kHz to 40 GHz*
- ANSI C63.4-2014, *American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 18 GHz*
- ANSI C63.10-2020, *American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices*, modified per ANSI C63.10-2020/Cor.1-2023, *Corrigendum 1*
- ANSI C63.30-2021, *American National Standard for Methods of Measurement of Radio-Frequency Emissions from Wireless Power Transfer Equipment*
- CISPR 16-1-1:2019-05, *Specification for radio disturbance and immunity measuring apparatus and methods — Part 1-1: Radio disturbance and immunity measuring apparatus — Measuring apparatus* (Edition 5.0)
- ETSI EN 302 537 v2.1.1 (2016-10), *Ultra Low Power Medical Data Service (MEDS) Systems operating in the frequency range 401 MHz to 402 MHz and 405 MHz to 406 MHz; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU*
- IEC/IEEE 62209-1528 Ed.1.0 (2020-10), *Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Part 1528: Human models, instrumentation, and procedures (Frequency range of 4 MHz to 10 GHz)*

4.4 ICES-Gen/RSS-Gen application

For Type 1 WPT devices, RSS-216 shall be used in conjunction with ICES-Gen for general specifications and information.

In case of Type 2 and Type 3 WPT devices, RSS-216 shall be used in conjunction with RSS-Gen for general specifications and information. The WPT fundamental frequency, including fundamental components of modulation, of Type 2 and Type 3 WPT devices shall not fall within the restricted bands specified in RSS-Gen.

5. Technical requirements

This section specifies the technical requirements related to this standard.

5.1 Multiple voltages or wide voltage range

Some WPT client devices can be designed for multiple direct-current (DC) output voltages, e.g. for integration in various products of different models where not all of these use the same battery type. Similarly, some WPT source devices can be intended for multiple alternative-current (AC) mains supply voltages or an AC mains voltage range (or various DC power supply options).

The equipment under test (EUT) shall comply with the requirements of this standard for all supply voltages intended for the Canadian market. In this context, "supply voltage" is either the voltage at the input of the WPT source device (its power supply) or the voltage at the output of the WPT client device (e.g. used for charging a battery).

In case of a supply voltage range or multiple supply voltages, compliance may be demonstrated either through separate tests for each variant or by testing the worst-case variant after determining, through a combination of engineering analysis and/or measurements, the variant that has the highest emission relative to the applicable limit. To note that the worst-case variant can be different for each particular requirement (e.g., conducted emission limits, or radiated emission limits below 30 MHz). If testing is not performed on each variant, the test report shall include the engineering analysis and the justification for the selection of the worst-case variant (the one that was tested), for each applicable requirement.

5.2 Measurement methods

This section specifies the applicable measurement methods.

5.2.1 General

The requirements specified in ANSI C63.30 (such as for test instrumentation, test site, measurement methods, EUT configuration, EUT arrangement, and EUT operation), with the deviations specified in annex A, shall be followed to demonstrate compliance with RSS-216. However, the following exceptions apply based on the specific type of WPT device:

a. The radiated emissions above 40 GHz for Type 1 WPT devices shall be measured using the procedure and corresponding requirements in ANSI C63.10.

b. For Type 2 and Type 3 WPT devices, ANSI C63.10 shall apply in conjunction with ANSI C63.30. Where there are conflicting requirements between the two, ANSI C63.10 shall take precedence.

NOTE: ANSI C63.10 refers to ANSI C63.30 for EUT configuration and operation requirements in case of WPT.

Where there is contradiction between ANSI C63.30 or ANSI C63.10 and this standard, RSS-216 shall take precedence.

5.2.2 Equipment implanted in or worn on the human body

Equipment intended to be implanted in or worn on the human body while in WPT mode of operation, shall be tested in/on a simulated human torso in order to replicate actual operating conditions.

NOTE: If the equipment is not designed to be worn on the human body while in WPT mode of operation (e.g. charging), it is not subject to this section.

The simulated human torso shall be constructed as specified in subclause B.1.1.3 (Annex B) of ETSI EN 302 537 (2016-10). The filling liquid shall have a relative permittivity and a conductivity complying with the values listed in Table 2 (subclause 6.2.2) of IEC/IEEE 62209-1528 (2020-10), with a maximum tolerance of ±10%, at the WPT frequency of the EUT. Where the WPT frequency is below 4 MHz or above 10 GHz, the values specified for 4 MHz and 10 GHz shall apply, respectively. For WPT frequencies not listed in that table, linear interpolation shall be used to determine the required values from the values at the nearest two frequencies, one below and one above the WPT frequency. The tissue simulating liquid shall be at a nominal temperature between 22 °C and 38 °C during the tests.

The simulated human torso shall be placed on the support table, but it shall be ignored when determining the placement of the various EUT units and cables for testing according to section 5.2.1 (i.e. test setup is based on the distance from the actual EUT and its cables rather than the distance from the simulated human torso).

Equipment intended to be worn on the human body shall be affixed to the outside surface of the simulated human torso at a height of 38 cm from its bottom. In case of equipment intended to be implanted into the human body, the same 38 cm height shall be used, but the equipment shall be placed inside the simulated human torso, at a separation from the side wall that is representative of its intended use inside the human body.

The test arrangement, including that of the simulated human torso, as well as the relative permittivity and conductivity of the filling liquid shall be documented in the test report.

5.3 Limits

This section specifies the applicable emission limits.

5.3.1 Industrial, scientific and medical (ISM) equipment

The EUT is ISM equipment if it meets both conditions below:

a. The WPT device is Type 1.

b. The WPT source or the WPT client subassembly is either part of a device (the EUT) subject to ICES-001, or intended to be used exclusively with equipment subject to ICES-001.

NOTE 1: If the EUT (WPT source or client or system) has no other functionality (other than WPT), but it is intended to be used with various equipment models, some of which are not ISM, then it is not considered ISM.

NOTE 2: If an EUT that is a WPT source device and its associated WPT client devices have no other functionality (other than WPT), but all WPT client devices are exclusively intended to be used with ISM equipment, then the EUT WPT source device is considered ISM.

Equipment classified as ISM is exempt from the limits specified in sections 5.3.2 and 5.3.3 for all its emissions occurring at frequencies inside the ISM bands listed in table 1. However, the equipment shall comply with the specified limits at all emission frequencies located outside the ISM bands and at the edges of these bands.

Table 1: ISM frequency bands

Centre frequency (MHz)	Bandwidth (MHz)	Lower limit (MHz)	Upper limit (MHz)
6.78	± 0.015	6.765	6.795
13.56	± 0.007	13.553	13.567
27.12	± 0.163	26.957	27.283
40.68	± 0.020	40.660	40.700
915	± 13	902	928
2,450	± 50	2,400	2,500
5,800	± 75	5,725	5,875
24,125	± 125	24,000	24,250
61,250	± 250	61,000	61,500
122,500	± 500	122,000	123,000
245,000	± 1,000	244,000	246,000

5.3.2 Conducted emissions

The equipment shall comply with the quasi-peak and the average limits specified in table 2 for the AC mains power terminals disturbance voltages.

Table 2: Conducted emission limits (AC mains terminals)

Frequency range (MHz)	quasi-peak (dBµV)	average (dBµV)
0.009 to 0.05	110	—
0.05 to 0.15	90 to 80	—
0.15 to 0.5	66 to 56	56 to 46
0.5 to 5	56	46
5 to 30	60	50

i. The more stringent limit applies at transition frequencies.

ii. In the 0.05 MHz to 0.15 MHz and 0.15 MHz to 0.5 MHz frequency ranges the limit level in dBµV decreases linearly with the logarithm of frequency.

5.3.3 Radiated emissions

This section specifies the radiated emission limits.

5.3.3.1 Radiated emission limits from 9 kHz to 30 MHz

The radiated emission limits in this section apply to the EUT if one or both of the following conditions apply:

a. the WPT fundamental frequency is located in this band

b. the EUT construction or intended installations can cause large magnetic dipole moments at frequencies located in this band (e.g. the EUT is intended to be connected to external long single wires that can form a loop in actual installations)

If the EUT fits within an imaginary sphere having a diagonal of 1.6 m, it shall comply either with the limits in table 3, in terms of magnetic field strength measured at a distance of 3 m from the EUT's boundary, or with the limits in table 4, in terms of induced current measured with a 2 m large loop antenna system (LLAS). EUTs larger than 1.6 m shall comply with the limits in table 3.

Table 3: Magnetic field strength limits at 3 m distance (9 kHz to 30 MHz)

Frequency range (MHz)	quasi-peak (dBµA/m)
0.009 to 0.07	69
0.07 to 0.15	69 to 39
0.15 to 30	39 to 7
i. In the 0.07 MHz to 0.15 MHz and 0.15 MHz to 30 MHz frequency ranges the limit level in dBµA/m decreases linearly with the logarithm of frequency.	

Table 4: Induced current limits (9 kHz to 30 MHz)

Frequency range (MHz)	horizontal, quasi-peak (dBµA)	vertical, quasi-peak (dBµA)
0.009 to 0.07	88	106
0.07 to 0.15	88 to 58	106 to 76
0.15 to 30	58 to 22	76 to 40
i. The "horizontal" limit applies to horizontally-polarized magnetic field, as measured with each of the two vertically-positioned large loop antennas of the LLAS. The "vertical" limit applies to induced currents measured with the horizontally-positioned large loop antenna of the LLAS. ii. In the 0.07 MHz to 0.15 MHz and 0.15 MHz to 30 MHz frequency ranges the limit level in dBµA decreases linearly with the logarithm of frequency.		

5.3.3.2 Radiated emission limits from 30 MHz to 1000 MHz

The EUT shall comply with the following radiated emission limits, in terms of electric field strength measured at a distance of 10 m from the EUT's boundary:

Table 5: Electric field strength limits at 10 m distance (30 MHz to 1000 MHz)

Frequency range (MHz)	quasi-peak (dBµV/m)
30 to 230	30
230 to 1000	37
i. The more stringent limit applies at the transition frequency.	

5.3.3.3 Radiated emission limits from 1 GHz to 200 GHz

The electric field strength measured at a distance of 3 m from the EUT boundary shall not exceed the following limits. Both the average and the peak limits shall apply.

- 54 dBµV/m using an average detector; and
- 74 dBµV/m using a peak detector.

These limits shall apply from 1 GHz up to the upper frequency determined per the RSS-Gen requirements related to the frequency range for measuring unwanted emissions.

5.4 Alternative emission limits

Some Type 3 WPT source devices are allowed relaxed emission limits, as described in this section, instead of the limits from section 5.3. Mixing requirements from both sections is not permitted.

Type 3 WPT source devices may apply the requirements specified in annex B, *Devices operating in frequency bands for any application*, of RSS-210, except for the frequency ranges and requirements restricted to specific types of devices. The WPT device shall also comply with the additional requirements specified in RSS-Gen that apply to RSS-210 devices (such as for conducted emissions on AC mains power terminals). The device shall employ digital modulation techniques resulting in spectral characteristics similar to direct sequence systems.

5.5 RF exposure requirements

The RF exposure requirements for WPT devices are specified in RSS-102, *Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)*. The RF exposure requirements of RSS-102 shall apply regardless of the type classification of the WPT device. However, the following conditions apply:

a. Type 1 WPT devices do not require certification and testing may be performed by any competent laboratory, not necessarily by an ISED-recognized wireless device testing laboratory.

b. Type 2 WPT devices do not require certification, but testing shall be performed by an ISED-recognized wireless device testing laboratory (per RSS-Gen).

6. Labelling requirements

The manufacturer, importer or distributor shall meet the labelling requirements set out in this section for every unit of WPT equipment.

WPT devices that do not require certification (see section 4.2) shall be labelled as follows: the compliance label shall include the word “Canada” (or “CAN”) and a reference to the applicable standard, in both English and French. An example is given below:

CAN RSS-216 / CNR-216

where “CNR” stands for *Cahier des charges sur les normes radioélectriques*.

WPT devices that are host equipment (with integrated certified radio modules) where the host does not require certification (see section 4.2.1) shall be labelled both as specified above and per the labelling requirements for host products specified in RSS-Gen.

Devices that require certification (see section 4.2.1) shall be labelled per the requirements for certified products specified in RSS-Gen. The additional labelling specified above (e.g., “CAN RSS-216 / CNR-216”) is not necessary in this case.

Annex A: Deviations from ANSI C63.30 (normative)

A.1 General

ANSI C63.30 is a normative reference for this standard (RSS-216): see section 4.3. However, for the purposes of RSS-216, the deviations specified in this annex shall apply. To note that most of these deviations are in fact clarifications or alternatives to specific requirements of ANSI C63.30.

This annex is structured around specific topics, instead of specific clauses and subclauses of ANSI C63.30, since some of these topics include deviations to multiple such clauses and subclauses. The following table is provided for easier orientation through the annex:

Table A.1: ANSI C63.30-2021 clauses and subclauses affected by deviations

ANSI C63.30-2021 clause/subclause	RSS-216 deviation	ANSI C63.30-2021 clause/subclause	RSS-216 deviation
2	A.2	7.8.4.2	A.8.3.3 [i]
4.5.4	A.6.1	7.8.4.3	A.8.3.4 [i]
5.4.1	A.3	9	A.6.2
7.8.1	A.8.1	9.2.1	A.4
7.8.2.1	A.8.3.2 [i]	9.3	A.5
7.8.2.2	A.8.3.2 [i]	9.4.4.2	A.6.1
7.8.2.4	A.8.2, A.8.3.2 [i]	10.4.2	A.7
7.8.4.1	A.8.4	—	—

i. These deviations only apply for the case where the WPT transducers pair is vertical.

A.2 Measurement instrument

This deviation relates to clause 2 of ANSI C63.30-2021. The normative reference CISPR 16-1-1:2015-09 shall be replaced with CISPR 16-1-1:2019-05. The undated normative reference ANSI C63.2 shall be replaced with ANSI C63.2-2023.

A.3 Standard test site

The content of 5.4.1 of ANSI C63.30-2021 shall be replaced with the content of 5.4.1 plus Figure 5 of ANSI C63.4-2014.

A.4 Equipment under test (EUT) boundary

This section specifies deviations from subclause 9.2.1 of ANSI C63.30-2021. The EUT boundary used for radiated emission measurements shall be:

a. the smallest circumscribing circle, as specified in subclause 9.2.3 of ANSI C63.30-2021, except when A.4(b) applies;

b. the EUT periphery, as specified in subclause 9.2.2 of ANSI C63.30-2021, when the maximum radial displacement between the EUT periphery and the smallest circumscribing circle is greater than the value specified in Table F.2 from clause F.3 of ANSI C63.30-2021 (depending on the measurement distance and on the frequency of measurement). See clause F.4 of ANSI C63.30-2021 for recommended compliance assessment procedures.

The methods described in Annex F of ANSI C63.30-2021 are acceptable, for example using the largest inscribed circle as the EUT boundary (see F.5 of ANSI C63.30-2021). When using any of these methods, this shall be documented in the test report; same for the rationale demonstrating compliance with the limits per the normative requirements specified in A.4(a) and A.4(b), as applicable.

A.5 Extrapolation

When radiated emission measurements are not performed at the limit distance, the measured levels shall be extrapolated to the limit distance by using either the analytical method described in subclause 9.3 of ANSI C63.30-2021 or the empirical method described below (at a specific EUT emission frequency):

a. the direction of the highest emission level shall be determined by measuring all around the EUT at the selected measurement distance;

b. along the direction determined at A.5(a), additional measurements shall be performed at one or more other distances;

c. the measured results shall be plotted over distance using a logarithmic scale and the roll-off thus determined shall be extrapolated for obtaining the expected radiated emission level at the limit distance.

The rationale used for selecting the frequency or frequencies where the above process was applied shall be documented in the test report.

A.6 Radiated emission measurements at and above 1 GHz

These deviations relate to subclause 4.5.4 and clause 9 of ANSI C63.30-2021.

A.6.1 Measurement antenna

Notwithstanding the antenna beamwidth definition from subclauses 4.5.4 and 9.4.4.2 of ANSI C63.30-2021, a more relaxed antenna beamwidth definition may be used, corresponding to a greater attenuation, $A > 3$ dB. However, in this case, the difference ($A - 3$) dB shall be added to each measured result (at or above 1 GHz) before comparing with the limit for determining the EUT compliance.

In case of very tall or very wide EUTs, where it is impossible for the antenna beamwidth to encompass the entire EUT arrangement, additional investigations shall be performed for finding the highest emission level relative to the limit. When using this exemption, the rationale and the additional investigations, as well as the corresponding measurement results, shall be documented in the test report.

A.6.2 Measurement procedure

Radiated emission measurements may be performed either using the method specified in ANSI C63.30 (i.e. using controlled aiming of the antenna as it is scanned in height) or the method specified in ANSI C63.4. However, one and the same method shall be used for all measurements; mixing the two methods is not allowed. The test report shall specify which test method has been used.

A.7 Frequency stability

The frequency stability requirements with respect to ambient temperature specified in subclause 10.4.2 of ANSI C63.30-2021 shall apply only for WPT source devices intended for outdoor operation. This test shall be performed at the rated power supply voltage and for three ambient temperatures: –20 °C, +20 °C and +50 °C.

A.8 Land-operating vehicle

This section specifies the deviations related to subclause 7.8 of ANSI C63.30-2021.

A.8.1 EUT configuration

This section clarifies the EUT configuration requirements (see subclause 7.8.1 of ANSI C63.30-2021). The general requirements specified in subclause 7.3 of ANSI C63.30-2021 shall apply.

a. If the EUT is a WPT source or a WPT system, then:

    i. If the WPT primary device is designed to operate with only one specific electric vehicle (EV) model, the EUT shall be configured together with an EV of that model for all tests. An artificial vehicle shall not be used in this case except if the test report demonstrates that the artificial vehicle results in highest emission relative to the applicable limit.

ii. If the WPT primary device is designed to operate with a number of EV models having very similar mechanical characteristics and using the same WPT secondary device (same electronic circuitry and mechanical design), the EUT shall be tested while configured with an EV, which shall be selected such that EUT emissions are maximized. The EV model selection justification shall be included in the test report. An artificial vehicle shall not be used in this case except if the test report demonstrates that the artificial vehicle results in highest emission relative to the applicable limit.

iii. If the WPT primary device is designed to operate with a large variety of EV models, with significant design and construction differences between them, making it impractical to determine which EV model will result in worst-case emissions from the EUT, then the EUT shall be configured with an artificial vehicle for all tests.

iv. If the EUT is a WPT system and an artificial vehicle is used, this shall be representative of the WPT client(s) included in the WPT system under test.

b. If the EUT is a WPT client, then:

i. If the EUT is a specific EV model equipped with WPT client functionality, it shall be tested with a corresponding WPT source device designed to operate with the EUT.

ii. If the EUT is a specific WPT client subassembly, which can be installed onto a number of EV models having very similar mechanical characteristics, testing only one EV model is sufficient, provided the specific EV model selected for testing provides worst-case emissions from the EUT. The EV model selection justification shall be included in the test report. The selected EV, equipped with the WPT client subassembly, shall be tested with a corresponding WPT source device designed to operate with the EUT.

iii. If the EUT is a specific WPT client subassembly, which can be installed onto a large variety of EV models, with significant design and construction differences between them, making it impractical to determine which EV model will result in worst-case emissions from the EUT, then the EUT shall be configured as an artificial vehicle and it shall be tested with a corresponding WPT source device designed to operate with the EUT.

A.8.2 Artificial vehicle arrangement

This deviation is related to subclause 7.8.2.4 of ANSI C63.30-2021. When using the alternative arrangement of WPT client subassembly units, where some of these are placed on the floor near the mimic plate (instead of onto the mimic plate), there is no need to obtain prior agreement from ISED. However, the justification for not using an arrangement that is representative of typical installations (i.e., with all units onto the mimic plate) shall be documented in the test report.

A.8.3 Vertical WPT transducers pair

This section specifies the EUT configuration, arrangement, and operation requirements applicable when the WPT transducers pair is installed vertically in actual use.

A.8.3.1 General

For all measurements, the various system components shall be held in place in a way that is representative of typical installations, but selected such as to maximize the EUT's emissions. The supports used to hold the various system components in place, if any, shall be made of an insulating material and they shall be described in the test report.

In case the intended use allows either horizontal or vertical orientation, both of these arrangements shall comply with the applicable limits.

A.8.3.2 Artificial vehicle

Notwithstanding the prohibition stated in subclause 7.8.2.1 of ANSI C63.30-2021, the subclause 7.8.2 of ANSI C63.30-2021 shall also apply for vertically-oriented WPT transducers pair when using an artificial vehicle for testing, but with the deviations specified below:

a. Mimic plate (7.8.2.2 of ANSI C63.30-2021): the size of the mimic plate shall be determined using Table 8 of ANSI C63.30-2021 based on the horizontal dimension or the vertical dimension, whichever is smaller, of the side of the EV on which the WPT client subassembly is intended to be mounted.

b. Arrangement (7.8.2.4 of ANSI C63.30-2021):

   i. The WPT client transducer shall be mounted on one side of the mimic plate and an aluminum plate shall only be used (between the WPT client transducer and the mimic plate) when also used in typical installations.

   ii. The positioning of the WPT client transducer onto the mimic plate shall be representative of typical installations:

   - If in typical installations the separation, *d*, between the centre of the transducer and either vertical edge of the EV side is equal to or greater than the half-width of the mimic plate dimension determined per A.8.3.2(a) above, then the WPT client transducer shall be centred horizontally onto the mimic plate.
   - If in typical installations the separation, *d*, between the centre of the transducer and either vertical edge of the EV side is smaller than the half-width of the mimic plate dimension determined per A.8.3.2(a) above, then the WPT client transducer shall be positioned such that its centre is at separation *d* from one of the two vertical edges of the mimic plate.
   - The WPT client transducer shall be positioned onto the mimic plate such that its height above the floor is representative of typical installations.

   iii. The mimic plate shall be placed vertically such that the WPT client transducer is at the applicable separation distance and degree of misalignment from the WPT source transducer. The separation between the lower horizontal edge of the mimic plate and the floor shall be representative of typical installations.

iv. If the WPT client subassembly consists of multiple units (e.g., WPT client transducer is a separate unit than the rest of the WPT client subassembly), the WPT client transducer shall be mounted on one side of the mimic plate, while all the other units shall be mounted on the other side of the mimic plate in a manner representative of typical installations. WPT client subassembly units, other than the WPT client transducer, may be installed alternatively on the floor, near the mimic plate, only when all of the following conditions are satisfied:

- All WPT client subassembly units that are not mounted onto the mimic plate shall be positioned as floor-standing equipment with one side at 20 cm separation from the mimic plate. The spacing between these floor-standing units shall be the same as in typical installations, where this is fixed (e.g., in the installation instructions), or 10 cm otherwise (e.g., where this spacing varies with each installation). For radiated emission measurements, the locations selected for these units shall be such as to minimize the EUT boundary circle.
- In case the artificial vehicle is the EUT, all WPT client subassembly units shall be installed onto the mimic plate (placing any unit beside the mimic plate, as floor-standing equipment, is not allowed).
- There is no need to obtain prior agreement from ISED for using this alternative arrangement of WPT client subassembly units. However, the justification for not using an arrangement that is representative of typical installations (i.e., with all units onto the mimic plate) shall be documented in the test report.

A.8.3.3 EUT arrangement

The EUT arrangement shall follow the requirements specified in subclause 7.8.4.2 of ANSI C63.30-2021 modified as follows:

a. In 7.8.4.2.2(a)(1) of ANSI C63.30-2021, the specified separation of the WPT source subassembly units is from the vertical plane including the mimic plate, not from the mimic plate's edge.

b. Subclause 7.8.4.2.2(a)(2) of ANSI C63.30-2021 does not apply.

c. In 7.8.4.2.2(b) of ANSI C63.30-2021, the artificial vehicle shall be arranged beside (not above) the WPT source, per typical installations.

d. Subclause 7.8.4.2.3(a)(2) of ANSI C63.30-2021 does not apply.

e. In 7.8.4.2.3(b) of ANSI C63.30-2021, the EV shall be arranged beside (not above) the WPT source, per typical installations.

A.8.3.4 Additional EUT arrangement requirements for radiated emissions

Subclause 7.8.4.3 of ANSI C63.30-2021 shall apply, with the following deviations:

a. The last sentence of the fourth paragraph and NOTE 2 do not apply. Since the WPT client transducer is placed vertically on the side of the EV, the minimum spacing between this transducer and the EUT boundary provided by the imaginary circle mentioned in this sentence is no longer justified.

b. The fifth paragraph does not apply.

A.8.4 Radiated emission measurements

The first, third, fourth, and sixth paragraphs of subclause 7.8.4.1 of ANSI C63.30-2021 do not apply for the purpose of RSS-216.

Measurements of radiated emissions shall be performed using Method 1, per subclause 7.8.4.3 of ANSI C63.30-2021, for all types of WPT EV devices. However, if measurements have been performed using Method 2, per subclause 7.8.4.4 of ANSI C63.30-2021 (for example, as part of a conformity assessment program for another country), then either:

a. the measurements shall be repeated using Method 1; or

b. the obtained radiated emission levels shall be adjusted with a correcting factor (margin) before comparing with the applicable limit as specified in Annex H of ANSI C63.30-2021. Therefore, Annex H of ANSI C63.30-2021 is conditionally normative for RSS-216 (it shall be used if measurements were performed using Method 2).